

out, would much reduce the inconvenience. He recommends those who can do so "to join a 'mutton club,' buying the lambs of a full-sized breed, and keeping them to at least three-and-a-half years old before killing. The price per pound will not be less than charged by the butcher, but it will supply an article twice as good as his." The remarks with reference to eggs are also very much to the point. "High game has fortunately gone out of fashion, and the most frequent form in which we now meet with decomposing albuminoid matter is that of a fusty egg. Some housekeepers seem to consider this quite good enough for made dishes, and thus spoil material worth ten times what they save by their nasty economy. No egg should be allowed to enter the kitchen that has the slightest smell of rotten straw."

In accordance with the opinion of most of the medical profession and of a large body of the public, we read that "as a regular beverage for a healthy person there is no wine in the English market equal to claret." No doubt the statistics of a few years hence will prove that the present reaction against port and sherry will make itself evident in the considerable diminution of the number of those who are liable to be attacked with the gout, and so demonstrate the advantages of the lighter wine.

In the section on the special dietetics of health many important remarks are to be found. Hints are given to those who pursue the commercial, the literary, and professional life, special chapters being devoted to each. The regimen of infancy and motherhood, of childhood and youth, are not omitted. Dr. Chambers is not the only author who inveighs against afternoon tea, and we cannot agree with the argument on which his objections are based. He tells us that "the dilution and washing away of the gastric secretion weakens its power of digesting the subsequent dinner, improperly blunts the appetite, and not unfrequently generates flatulence and dyspepsia." But the gastric juice is not secreted if solid food is not taken, and any fluid introduced into the stomach can hardly but be absorbed within a quarter of an hour or so. The substitute suggested, "a biscuit, and an orange or an ice," is, in our estimation, much more injurious.

Over thirty pages are devoted to the question of the value of alcohol, the results being too lengthy to summarise on the present occasion. They are well worth reviewing. "So me well-meaning persons think to discourage intemperance in drink by affecting a cynical carelessness as to the quality of that which is consumed. . . . However little a man's purse allows him to drink, let it be good."

The question of the dietetics of disease will appeal to all who have the charge or any interest in those who are invalided. They bear the same practical impress as the other portions of the work. Though some of the author's suggestions may appear to be founded on a somewhat dogmatic basis, they all have an element of truth in them which may lead the reader to think twice of the reasons why he is accustomed to adopt any line of action which may be directly opposed to them.

#### OUR BOOK SHELF

*An Elementary Exposition of the Doctrine of Energy.*  
By D. D. Heath, M. A., formerly Fellow of Trinity College, Cambridge. (Longmans, Green, and Co.)

In this book we have a very good elementary exposition

of the Doctrine of Energy; perhaps, however, better adapted for the use of schools than for the general public. Indeed, we are told in the preface that the work was developed from a set of lectures given to the senior classes of Surrey County School. In his discussion of fundamental units the author makes some very good and original remarks. He tells us, for instance, in connection with the first law of motion, that "the *rate* and the *direction* of motion with and in which (respectively) a body is moving at any moment is to be considered as part of its *actual condition* at that moment, which it will retain until some adequate cause changes either the velocity or the direction, or both. We may reasonably inquire *how it got* the motion it has, as we may how it came by its shape or its temperature; and again, under what circumstances it will change any of these properties; but not *why*, having got them, it keeps them."

After dismissing the subject of fundamental units, the writer goes on to dynamical energy, a subject which is fully and fairly discussed. The author next proceeds to thermal and other energies, and ends by a brief account of molecular theories. If we have any fault to find, it is that undue preference seems to be given to the British system of units, while the decimal system is overlooked.

We think, too, that in the introductory part of the work the author is not very clear in his statement with regard to energy, where he tells us we may define it to be "the capacity or power of any body or system of bodies, when in a given condition, to do a certain measurable quantity of work; that is, to change its own condition and that of other bodies, exhausting its power by the using of it." We think that the second part of this definition might have been omitted with advantage.

The author, as he tells us in his preface, has endeavoured to give the young student some conception of the *possibility* of explaining the conservation of energy by the theory that all phenomenal changes are really in themselves changes of motion and position among the molecules or ultimate atoms of substances; and he adds the hope that he has succeeded in presenting this as exhibiting a probable surmise, which may be false without vitiating the doctrine previously developed.

This strikes us as being very well put. The conservation of energy would hold if we imagine the universe to be composed of ultimate atoms with forces acting in lines between them; but should it be found that this last conception is inapplicable to portions of the universe, as, for instance, the medium which conveys light, nevertheless it does not follow that the conservation of energy does not still hold true.

*The Commercial Handbook of Chemical Analysis.* By A. Normandy. New edition, enlarged, by Henry M. Noad, Ph.D., F.R.S. (London: Lockwood and Co., 1875.)

WHEN the late Dr. Normandy first published his work on Commercial Analysis the Adulteration Act did not exist, and the book was chiefly used by chemical manufacturers and by the small class of practical analysts. Dr. Noad's enlarged edition of the work appears very opportunely, and it will be found to be essential to the analysts appointed under the new Act. It contains, in alphabetical order, a concise list of all ordinary substances which can require to be analysed in connection with food and drink, and in addition the methods of analysing many substances which can only be required in special manufactures, or are only used as drugs. Each article commences with an account of the substance in its pure state: this is followed by a list of the most common impurities or adulterations, and then by the best means of detecting them. The adulterations of some common commodities are somewhat startling; thus, bread may contain rye and barley flour, oatmeal, pea and bean meal, potato starch and rice flour, while of mineral constituents there may be lime, alum, magnesia, ground soapstone,

and sulphate of copper. The substances sometimes employed to colour sweetmeats, liqueurs, jellies, &c., include some of the most fatal poisons, such as the acetate, arsenite, and carbonate of copper; chromate and iodide of lead, and the sulphides of arsenic and mercury. Indeed, we well remember going over a sweetmeat manufactory, and on remarking on the bright yellow colour of some large comfits we were told that chrome yellow was employed to produce it, our informant evidently having no idea that the substance is a most virulent poison. A long article is devoted to the adulteration and fabrication of wines, and the "plastering" and "fortifying" of sherries is discussed at length. In all cases the most recent results are given, and the work is well edited and carefully written. A glossary at the end of the book will be found useful both to the analyst and the student.

### LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.]

#### "The Unseen Universe"

WE have read with satisfaction (NATURE, vol. xii. p. 41), your very candid and fair *præcis* of our recent work, "The Unseen Universe." There are, however, one or two comments added in which the writer seems to have misapprehended our meaning, possibly from the fact that in the first edition of such a work the arrangement may be regarded as not having quite taken its final shape.

To begin, we fail to understand what the reviewer means when he says, "It is a mere theological dogma to say that what energy perishes in the visible passes into the invisible universe; and the dogma is worthless as a physical principle on which to build any physical reasoning."

Our views will be found on p. 159 of our book: "*May we not say that when energy is carried from matter into ether it is carried from the visible into the invisible?*" Surely the ether may be looked upon as forming part of the invisible universe, and also as having received a large portion of the energy which was once attached to visible matter.

Our object was to show that we introduced no new dogma inconsistent with the received ideas regarding energy, inasmuch as these contemplate an invisible universe as truly as we ourselves do.

The second point upon which we would remark is the assertion of the reviewer that by regarding the visible universe as an infinite whole, the arguments on which its end and its beginning are inferred seem to vanish. In reply to this we would remark, that even allowing (which we are not disposed to allow) that the visible universe is infinite, this would not affect our argument against its past eternity. Our argument (see p. 127 of the book) is, that *the dissipation of the energy of the visible universe proceeds, pari passu, with the aggregation of mass, and the very fact therefore that the large masses of the universe are of finite size is sufficient to assure us that the process cannot have been going on for ever.*

THE AUTHORS OF "THE UNSEEN UNIVERSE."

#### Sense of Humour and Reason in Animals

IN the recently published edition of the "Descent of Man" there is some additional matter concerning the above subjects, and as the following illustrative cases fell under my own observation, I think it is worth while to publish them as supplementary to those adduced by Mr. Darwin.

Several years ago I used to watch carefully the young Orang Outang at the Zoological Gardens, and I am quite sure that she manifested a sense of the ludicrous. One example will suffice. Her feeding-tin was of a somewhat peculiar shape, and when it was empty she used sometimes to invert it upon her head. The tin then presented a comical resemblance to a bonnet, and as its wearer would generally favour the spectators with a broad grin at the time of putting it on, she never failed to raise a laugh from them. Her success in this respect was evidently attended with no small gratification on her part.

I once had a Skye terrier which, like all of his kind, was very intelligent. When in good humour he had several tricks, which I know to have been self-taught, and the sole object of which was evidently to excite laughter. For instance, while lying upon one side and violently grinning,\* he would hold one leg in his mouth. Under such circumstances nothing pleased him so much as having his joke duly appreciated, while if no notice was taken of him he would become sulky. On the other hand, nothing that could happen displeased him so much as being laughed at when he did not intend to be ridiculous. Mr. Darwin says:—"Several observers have stated that monkeys certainly dislike being laughed at" (p. 71). There can be little or no doubt that this is true of monkeys; but I never knew of a really good case among dogs save this one, and here the signs of dislike were unequivocal. To give one instance. He used to be very fond of catching flies upon the window-panes, and if ridiculed when unsuccessful, was evidently much annoyed. On one occasion, in order to see what he would do, I purposely laughed immoderately every time he failed. It so happened that he did so several times in succession—partly, I believe, in consequence of my laughing—and eventually he became so distressed that he positively *pretended* to catch the fly, going through all the appropriate actions with his lips and tongue, and afterwards rubbing the ground with his neck as if to kill the victim: he then looked up at me with a triumphant air of success. So well was the whole process simulated, that I should have been quite deceived, had I not seen that the fly was still upon the window. Accordingly I drew his attention to this fact, as well as to the absence of anything upon the floor; and when he saw that his hypocrisy had been detected, he slunk away under some furniture, evidently very much ashamed of himself.

The following example of *reason* in a dog is the most striking that has ever fallen within my personal observation. A son of the above-mentioned terrier followed a conveyance from the house at which I resided in the country, to a town ten miles distant. *He only did this on one occasion*, and about five months afterwards was taken by *train* to the same town as a present to some friends there. Shortly afterwards I called upon these friends in a different conveyance from the one which the dog had previously followed; but the latter may have known that the two conveyances belonged to the same house. Anyhow, after I had put up the horses at an inn, I spent the morning with the terrier and his new masters, and in the afternoon was accompanied by them to the inn. I should have mentioned that the inn was the same as that at which the conveyance had been put up on the previous occasion, five months before. Now, the dog evidently remembered this, and, reasoning from analogy, inferred that I was about to return. This is shown by the fact that he stole away from our party—although at what precise moment he did so I cannot say, but it was certainly *after* we had arrived at the inn; for subsequently we all remembered his having entered the coffee-room with us. Now, not only did he infer from a single precedent that I was going home, and make up his mind to go with me; but he also further reasoned thus:—"As my previous master lately sent me to town, it is probable that he does not want me to return with him to the country: therefore, if I am to seize this opportunity of resuming my poaching life, I must now steal a march upon the conveyance. But not only so, my former master may possibly pick me up and return with me to my proper owners: therefore I must take care only to intercept the conveyance at a point sufficiently far without the town, to make sure that he will not think it worth his while to go back with me." Complicated as this train of reasoning is, it is the simplest one I can devise to account for the fact, that slightly beyond the *third* milestone the terrier was awaiting me—lying right in the middle of the road with his face towards the town. I should add that the

\* This habit of violently grinning is not, I believe, uncommon among Skye terriers—the pure original breed of Skyes, I mean, and not the broad-nosed shaggy-coated animals which have almost supplanted them. The habit is very remarkable, for there can be no doubt, I think, that it is intended to imitate laughter. Many intelligent dogs understand the meaning of laughter as implying good humour. I have a setter just now, which always rouses up and whines for admittance to a room when he hears a good laugh going on, wagging his tail the while, in proportion to the varying intensity of the laughter; but I do not know of any other breed of dogs which actually *imitates* it—at all events not with such evident purpose as do Skye terriers. The purpose is evident, not only because the gesture is never made at any other time than when the animal wishes to be particularly agreeable; but also because the grin is carried to a highly unnatural degree—much more, *e.g.*, than the strongest snarl would require; and, which is stranger still, I have frequently seen my terrier on such occasions shaking his sides in a convulsive manner—an action he never performed at any other time.